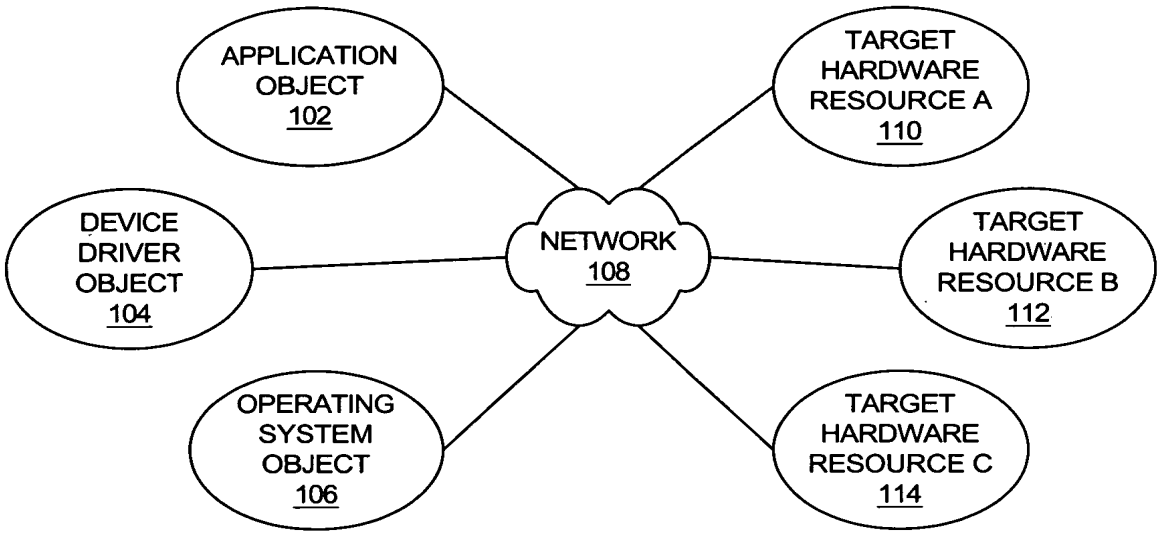


FIG. 1
(PRIOR ART)

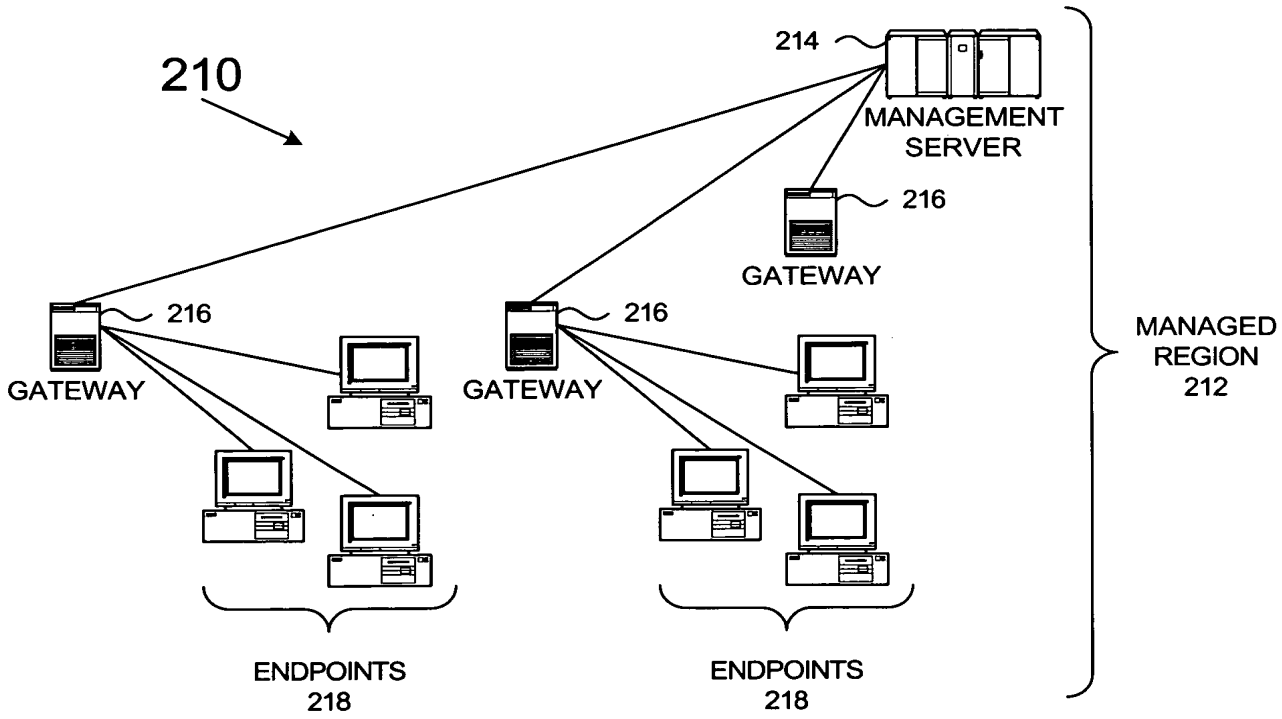


FIG. 2A

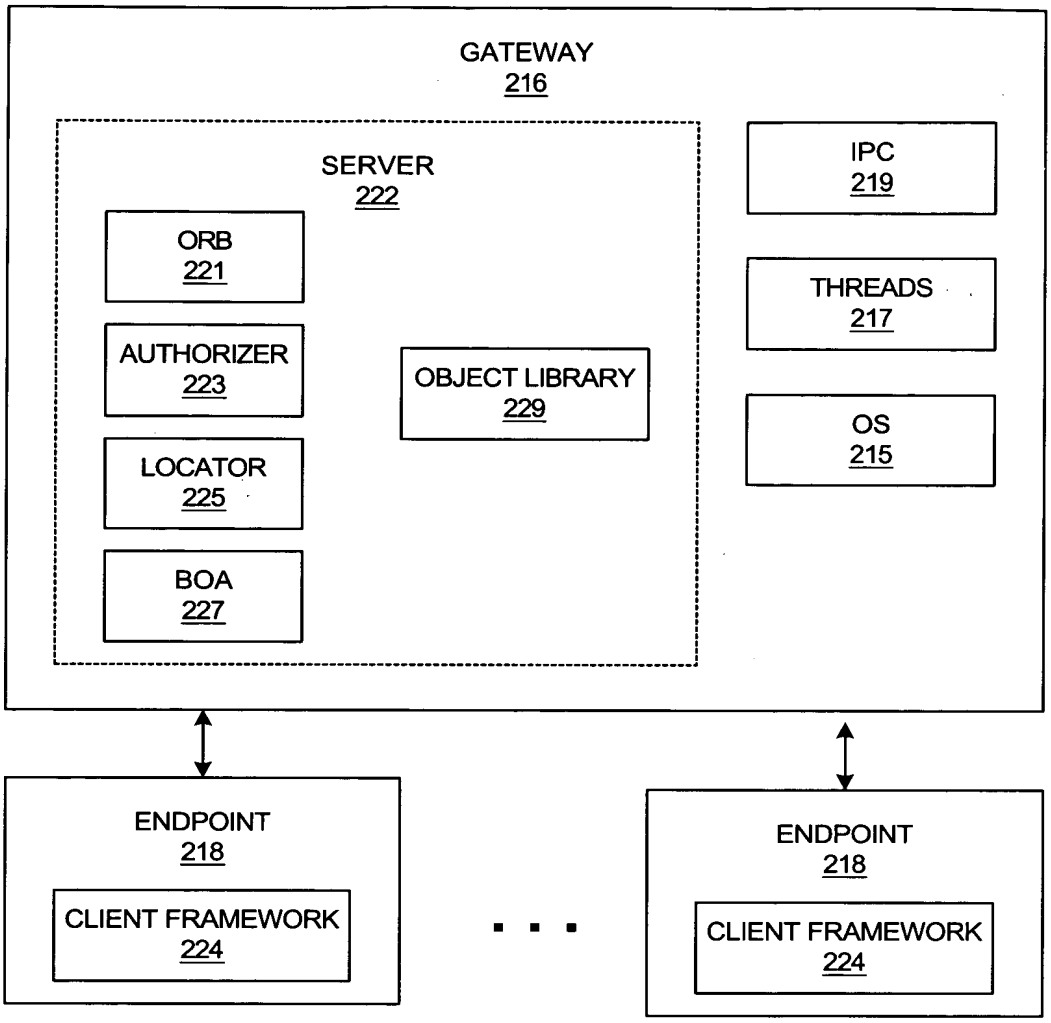

GATEWAY
216
SERVER
222
ORB
221
AUTHORIZER
223
LOCATOR
225
BOA
227
OBJECT LIBRARY
229
IPC
219
THREADS
217
OS
215
ENDPOINT
218
CLIENT FRAMEWORK
224
ENDPOINT
218
CLIENT FRAMEWORK
224

FIG. 2B

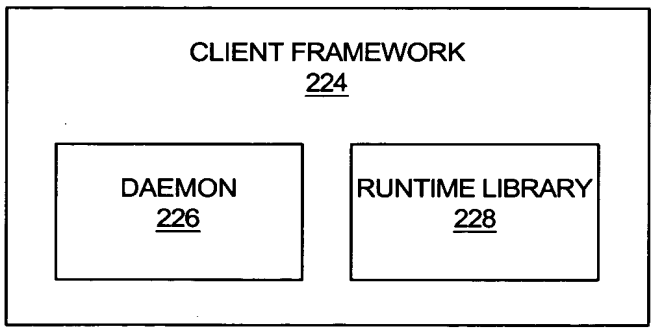

CLIENT FRAMEWORK
224
DAEMON
226
RUNTIME LIBRARY
228

FIG. 2C

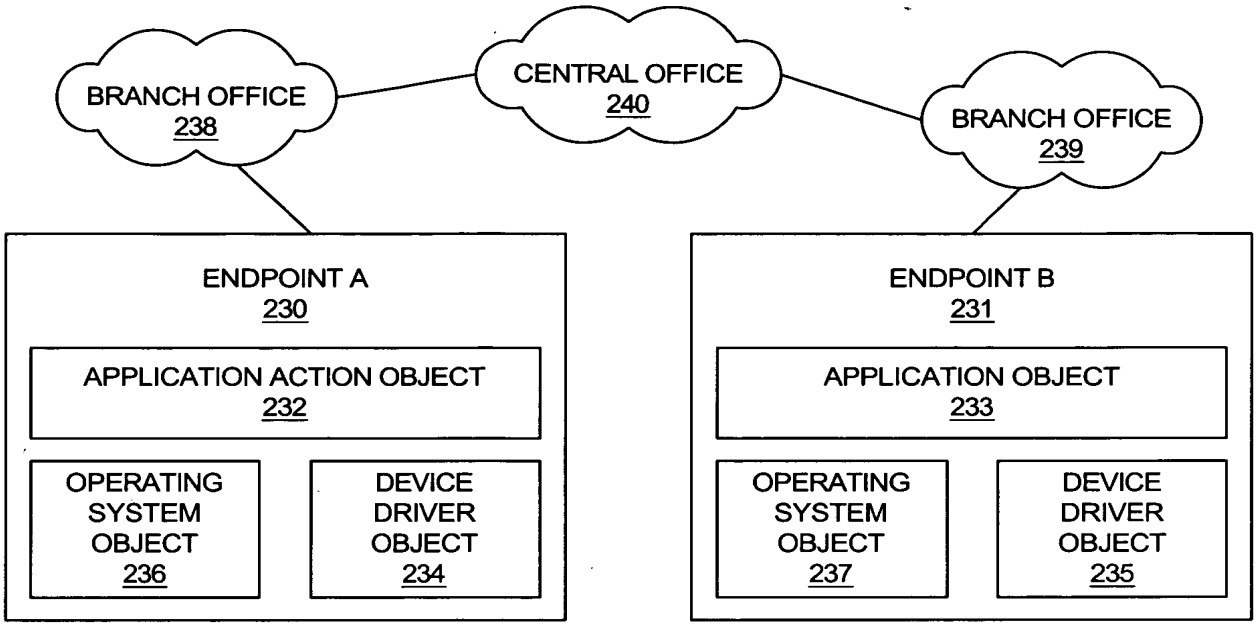
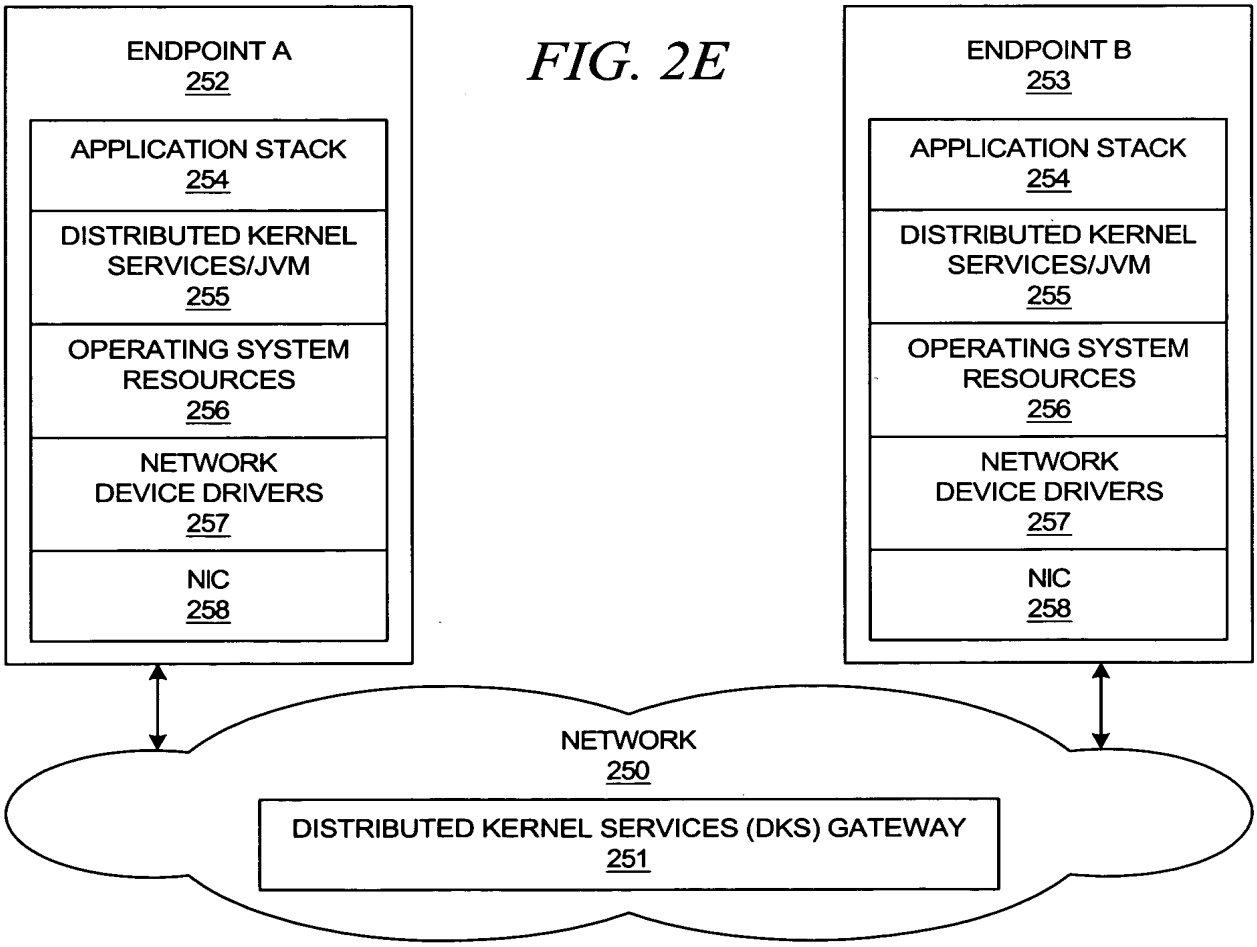

BRANCH OFFICE
238
CENTRAL OFFICE
240
BRANCH OFFICE
239
ENDPOINT A
230
APPLICATION ACTION OBJECT
232
OPERATING SYSTEM OBJECT
236
DEVICE DRIVER OBJECT
234
ENDPOINT B
231
APPLICATION OBJECT
233
OPERATING SYSTEM OBJECT
237
DEVICE DRIVER OBJECT
235

FIG. 2D

FIG. 2E


ENDPOINT A
252
APPLICATION STACK
254
DISTRIBUTED KERNEL SERVICES/JVM
255
OPERATING SYSTEM RESOURCES
256
NETWORK DEVICE DRIVERS
257
NIC
258
ENDPOINT B
253
APPLICATION STACK
254
DISTRIBUTED KERNEL SERVICES/JVM
255
OPERATING SYSTEM RESOURCES
256
NETWORK DEVICE DRIVERS
257
NIC
258
NETWORK
250
DISTRIBUTED KERNEL SERVICES (DKS) GATEWAY
251

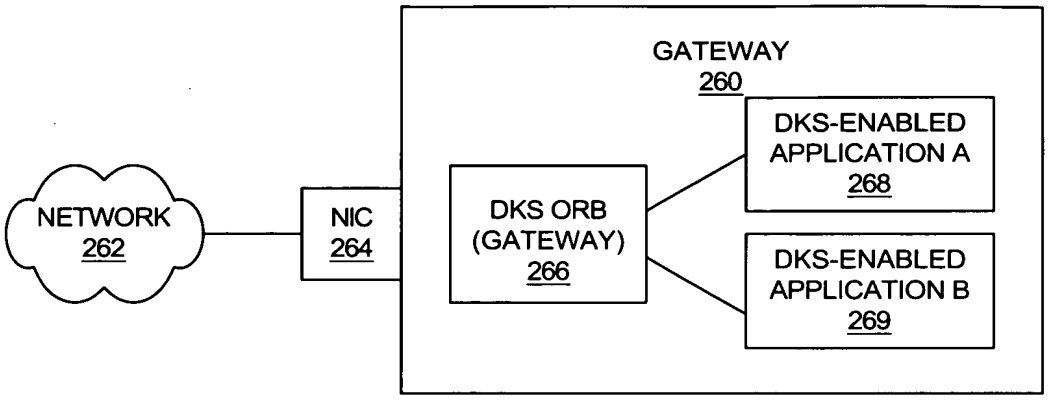

GATEWAY
260
DKS-ENABLED
APPLICATION A
268
DKS-ENABLED
APPLICATION B
269
DKS ORB
(GATEWAY)
266
NIC
264
NETWORK
262

FIG. 2F

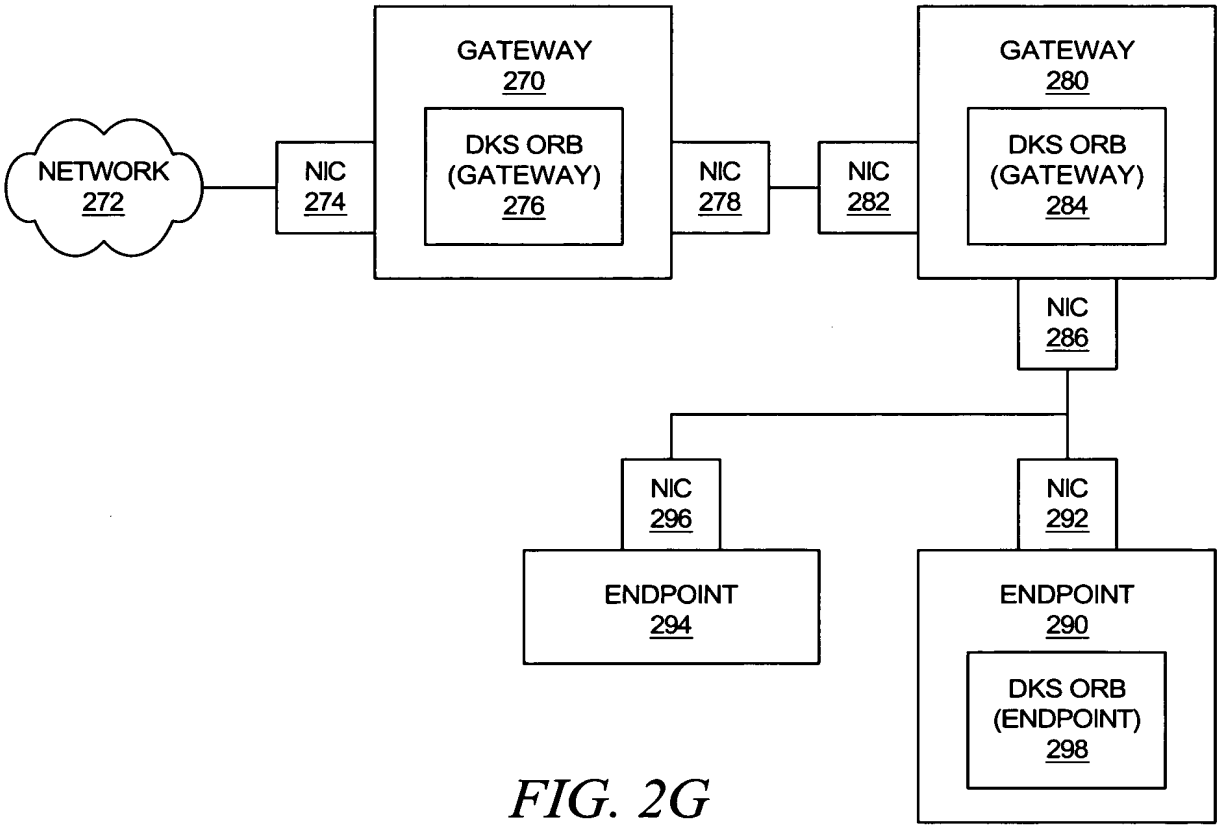

GATEWAY
270
DKS ORB
(GATEWAY)
276
GATEWAY
280
DKS ORB
(GATEWAY)
284
NETWORK
272
NIC
274
NIC
278
NIC
282
NIC
286
NIC
296
NIC
292
ENDPOINT
294
ENDPOINT
290
DKS ORB
(ENDPOINT)
298

FIG. 2G

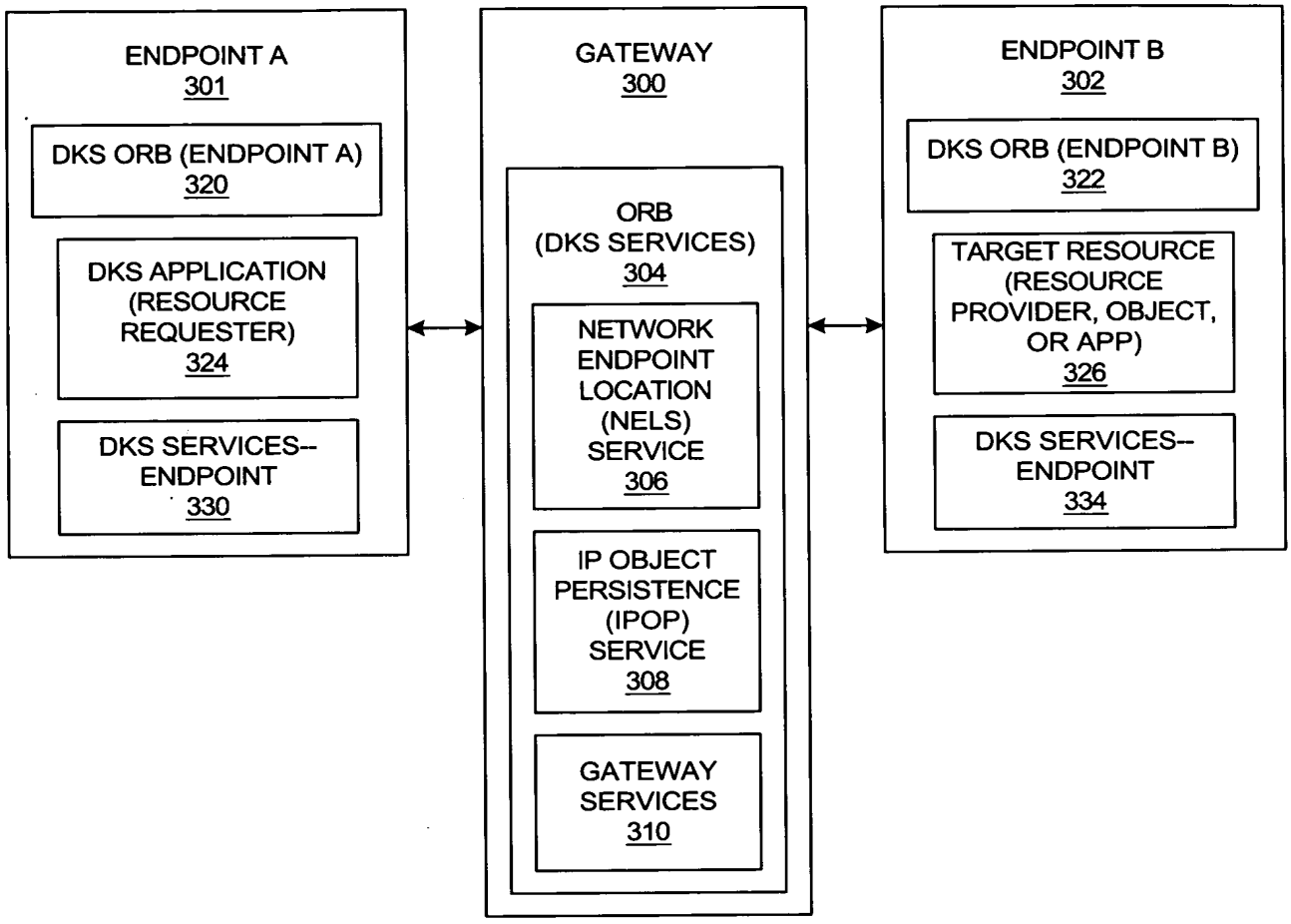

ENDPOINT A
301
DKS ORB (ENDPOINT A)
320
DKS APPLICATION (RESOURCE REQUESTER)
324
DKS SERVICES-- ENDPOINT
330
GATEWAY
300
ORB (DKS SERVICES)
304
NETWORK ENDPOINT LOCATION (NELS) SERVICE
306
IP OBJECT PERSISTENCE (IPOP) SERVICE
308
GATEWAY SERVICES
310
ENDPOINT B
302
DKS ORB (ENDPOINT B)
322
TARGET RESOURCE (RESOURCE PROVIDER, OBJECT, OR APP)
326
DKS SERVICES-- ENDPOINT
334

FIG. 3

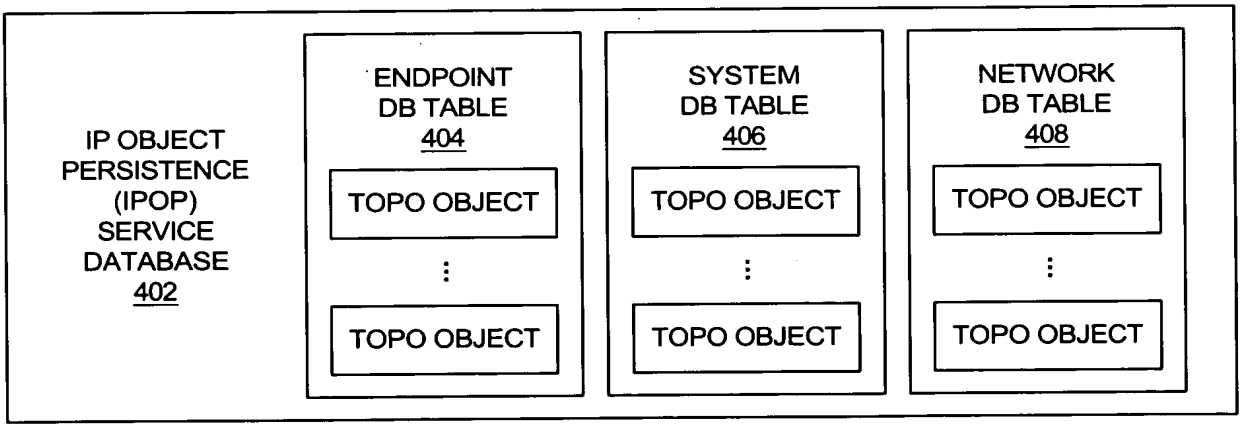

IP OBJECT PERSISTENCE (IPOP) SERVICE DATABASE
402
ENDPOINT DB TABLE
404
TOPO OBJECT
TOPO OBJECT
SYSTEM DB TABLE
406
TOPO OBJECT
TOPO OBJECT
NETWORK DB TABLE
408
TOPO OBJECT
TOPO OBJECT

FIG. 4

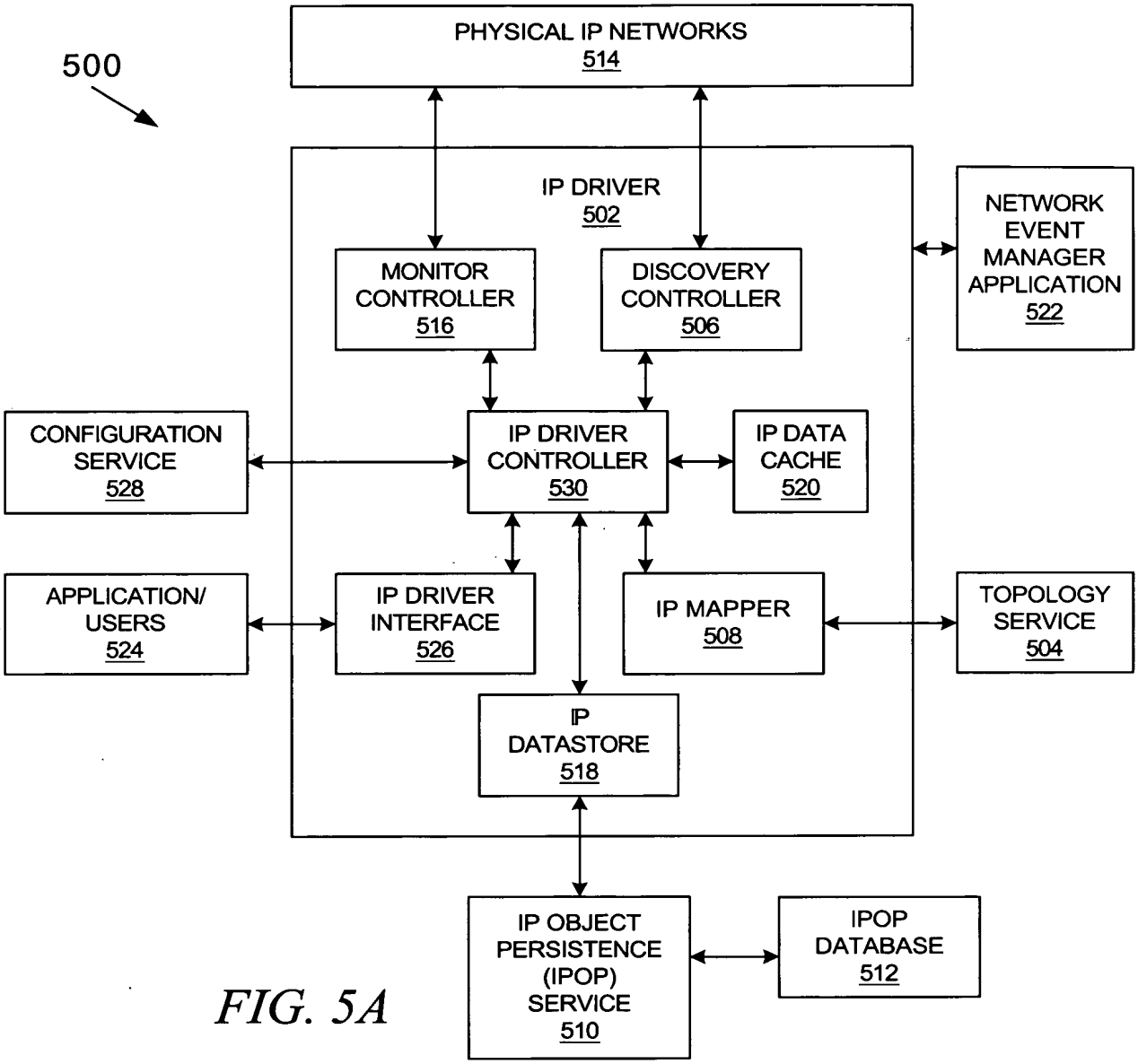

500
PHYSICAL IP NETWORKS
514
IP DRIVER
502
MONITOR CONTROLLER
516
DISCOVERY CONTROLLER
506
NETWORK EVENT MANAGER APPLICATION
522
CONFIGURATION SERVICE
528
IP DRIVER CONTROLLER
530
IP DATA CACHE
520
APPLICATION/ USERS
524
IP DRIVER INTERFACE
526
IP MAPPER
508
TOPOLOGY SERVICE
504
IP DATASTORE
518
IP OBJECT PERSISTENCE (IPOP) SERVICE
510
IPOP DATABASE
512

FIG. 5A

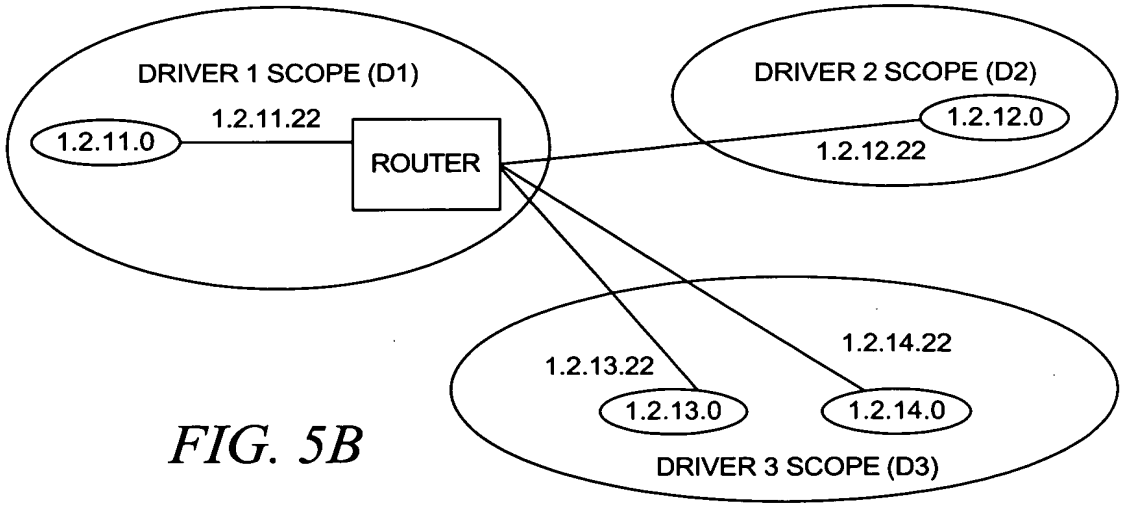

DRIVER 1 SCOPE (D1)
1.2.11.22
1.2.11.0
ROUTER
DRIVER 2 SCOPE (D2)
1.2.12.0
1.2.12.22
1.2.14.22
1.2.13.22
1.2.13.0
1.2.14.0
DRIVER 3 SCOPE (D3)

FIG. 5B

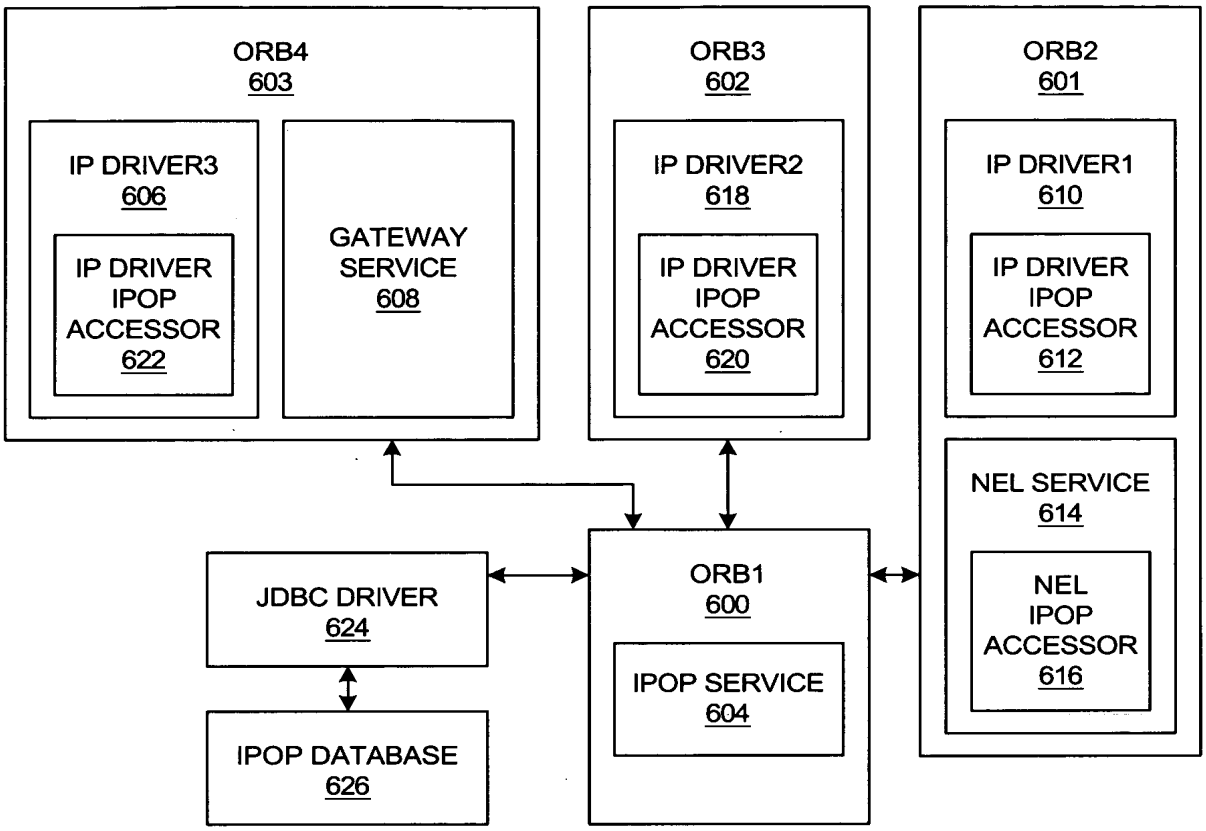

ORB4
603
IP DRIVER3
606
IP DRIVER
IPOP
ACCESSOR
622
GATEWAY
SERVICE
608
ORB3
602
IP DRIVER2
618
IP DRIVER
IPOP
ACCESSOR
620
ORB2
601
IP DRIVER1
610
IP DRIVER
IPOP
ACCESSOR
612
NEL SERVICE
614
NEL
IPOP
ACCESSOR
616
JDBC DRIVER
624
IPOP DATABASE
626
ORB1
600
IPOP SERVICE
604

FIG. 6

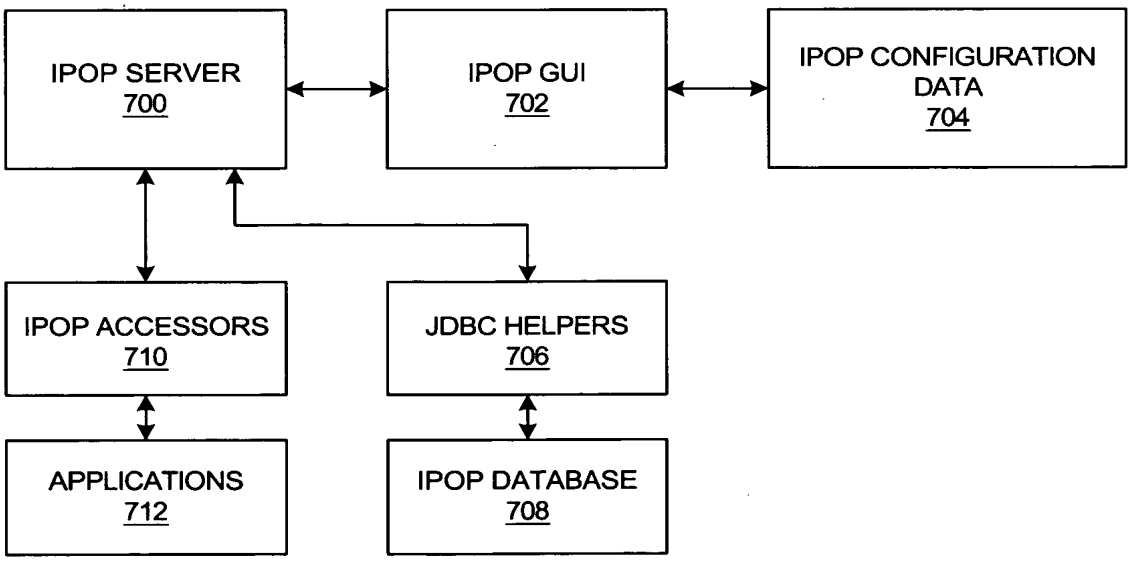

IPOP SERVER
700
IPOP GUI
702
IPOP CONFIGURATION
DATA
704
IPOP ACCESSORS
710
JDBC HELPERS
706
APPLICATIONS
712
IPOP DATABASE
708

FIG. 7

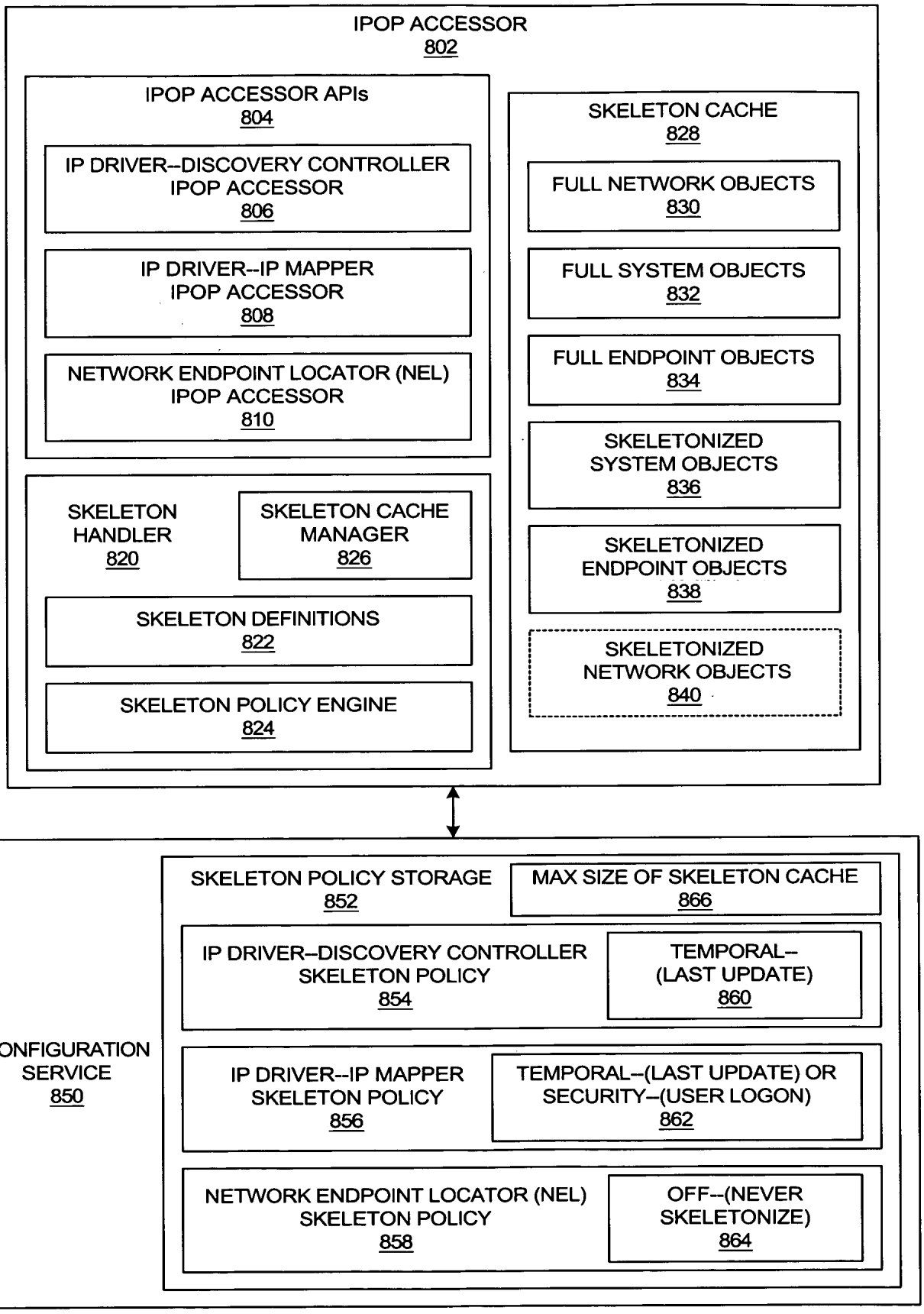

IPOP ACCESSOR
802
IPOP ACCESSOR APIs
804
IP DRIVER--DISCOVERY CONTROLLER IPOP ACCESSOR
806
IP DRIVER--IP MAPPER IPOP ACCESSOR
808
NETWORK ENDPOINT LOCATOR (NEL) IPOP ACCESSOR
810
SKELETON HANDLER
820
SKELETON CACHE MANAGER
826
SKELETON DEFINITIONS
822
SKELETON POLICY ENGINE
824
SKELETON CACHE
828
FULL NETWORK OBJECTS
830
FULL SYSTEM OBJECTS
832
FULL ENDPOINT OBJECTS
834
SKELETONIZED SYSTEM OBJECTS
836
SKELETONIZED ENDPOINT OBJECTS
838
SKELETONIZED NETWORK OBJECTS
840
CONFIGURATION SERVICE
850
SKELETON POLICY STORAGE
852
MAX SIZE OF SKELETON CACHE
866
IP DRIVER--DISCOVERY CONTROLLER SKELETON POLICY
854
TEMPORAL--(LAST UPDATE)
860
IP DRIVER--IP MAPPER SKELETON POLICY
856
TEMPORAL--(LAST UPDATE) OR SECURITY--(USER LOGON)
862
NETWORK ENDPOINT LOCATOR (NEL) SKELETON POLICY
858
OFF--(NEVER SKELETONIZE)
864

FIG. 8

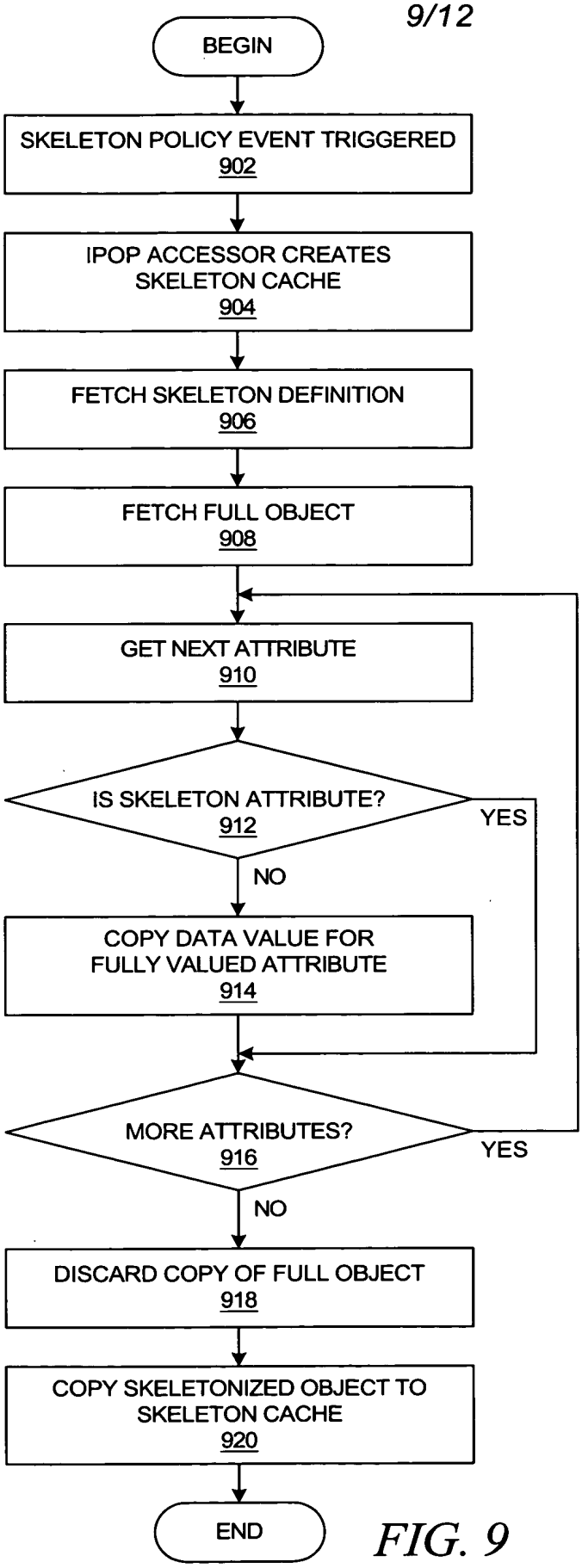

BEGIN
SKELETON POLICY EVENT TRIGGERED
902
IPOP ACCESSOR CREATES SKELETON CACHE
904
FETCH SKELETON DEFINITION
906
FETCH FULL OBJECT
908
GET NEXT ATTRIBUTE
910
IS SKELETON ATTRIBUTE?
912
YES
NO
COPY DATA VALUE FOR FULLY VALUED ATTRIBUTE
914
MORE ATTRIBUTES?
916
YES
NO
DISCARD COPY OF FULL OBJECT
918
COPY SKELETONIZED OBJECT TO SKELETON CACHE
920
END

FIG. 9

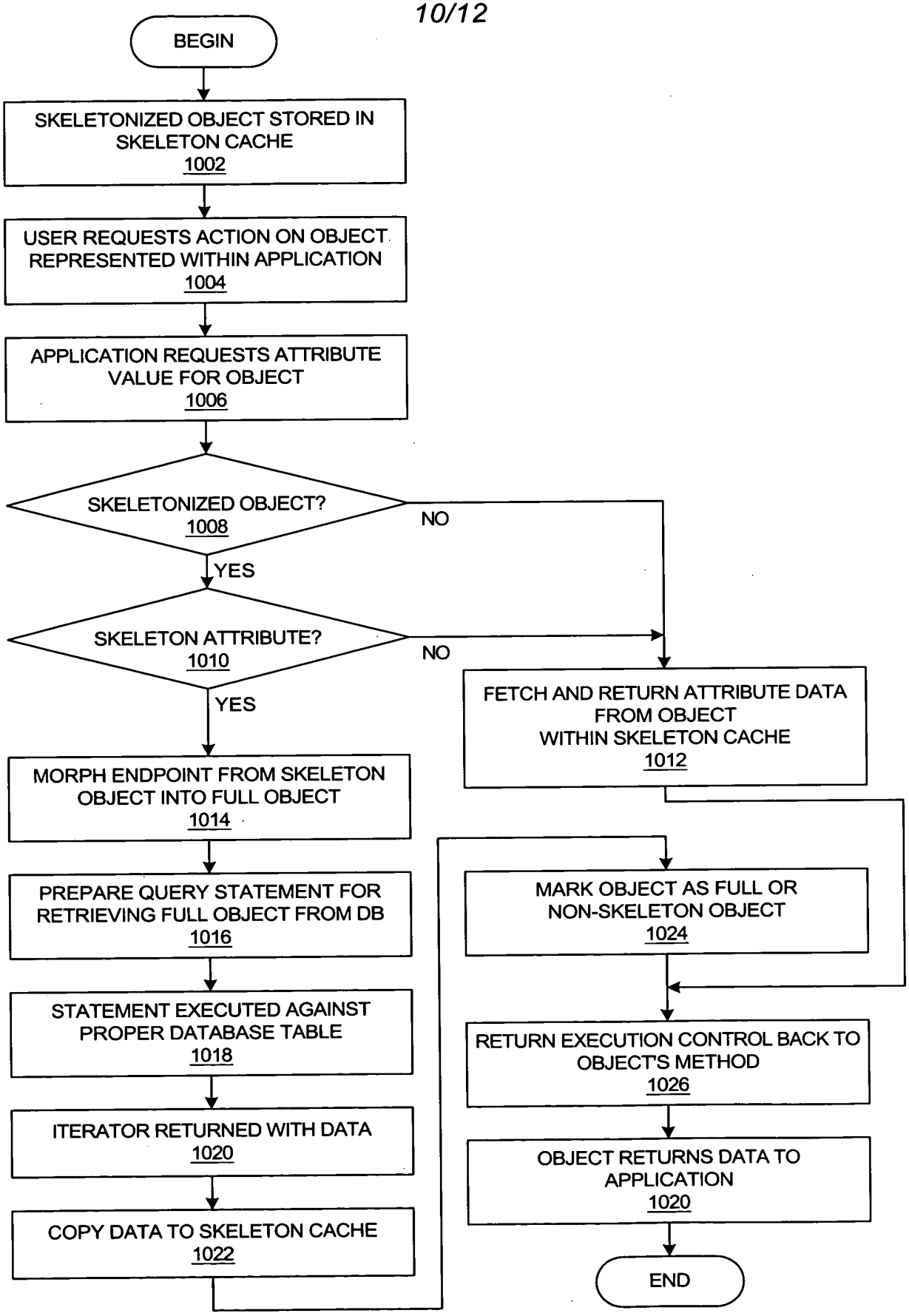

BEGIN
SKELETONIZED OBJECT STORED IN SKELETON CACHE 1002
USER REQUESTS ACTION ON OBJECT REPRESENTED WITHIN APPLICATION 1004
APPLICATION REQUESTS ATTRIBUTE VALUE FOR OBJECT 1006
SKELETONIZED OBJECT? 1008
NO
YES
SKELETON ATTRIBUTE? 1010
NO
YES
FETCH AND RETURN ATTRIBUTE DATA FROM OBJECT WITHIN SKELETON CACHE 1012
MORPH ENDPOINT FROM SKELETON OBJECT INTO FULL OBJECT 1014
PREPARE QUERY STATEMENT FOR RETRIEVING FULL OBJECT FROM DB 1016
STATEMENT EXECUTED AGAINST PROPER DATABASE TABLE 1018
ITERATOR RETURNED WITH DATA 1020
COPY DATA TO SKELETON CACHE 1022
MARK OBJECT AS FULL OR NON-SKELETON OBJECT 1024
RETURN EXECUTION CONTROL BACK TO OBJECT'S METHOD 1026
OBJECT RETURNS DATA TO APPLICATION 1020
END

FIG. 10

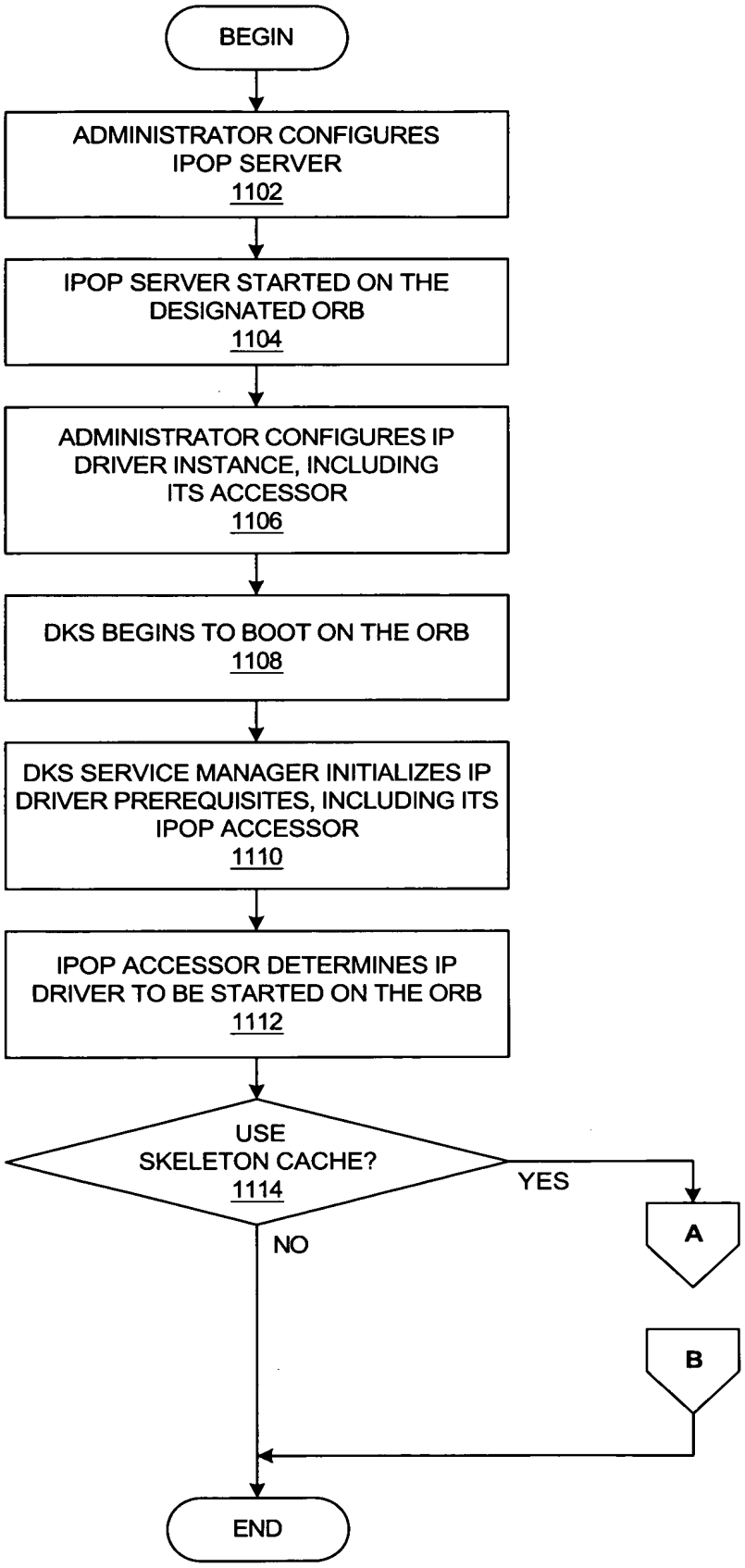

BEGIN
ADMINISTRATOR CONFIGURES IPOP SERVER
1102
IPOP SERVER STARTED ON THE DESIGNATED ORB
1104
ADMINISTRATOR CONFIGURES IP DRIVER INSTANCE, INCLUDING ITS ACCESSOR
1106
DKS BEGINS TO BOOT ON THE ORB
1108
DKS SERVICE MANAGER INITIALIZES IP DRIVER PREREQUISITES, INCLUDING ITS IPOP ACCESSOR
1110
IPOP ACCESSOR DETERMINES IP DRIVER TO BE STARTED ON THE ORB
1112
USE SKELETON CACHE?
1114
YES
NO
A
B
END

FIG. 11A

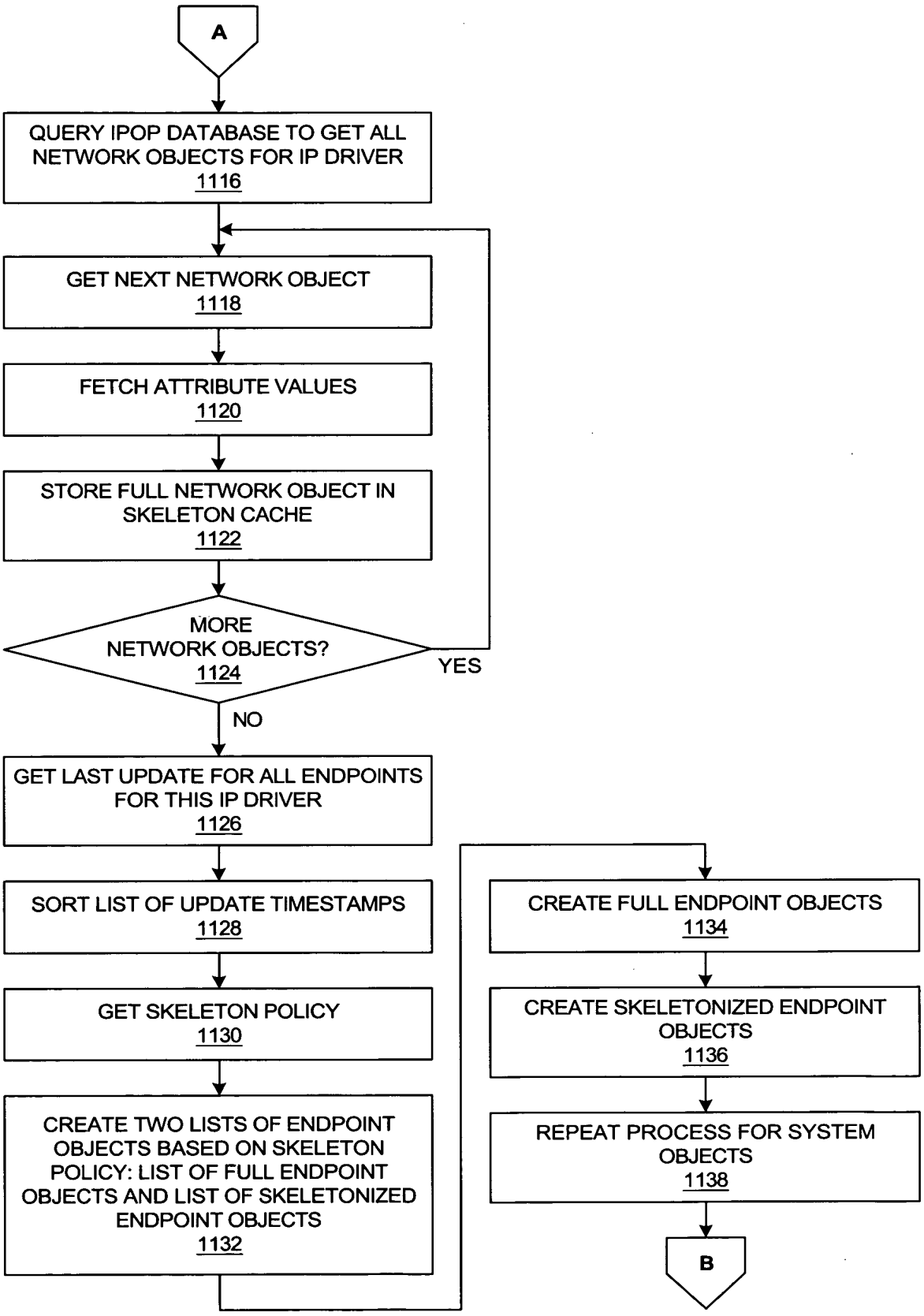

A
QUERY IPOP DATABASE TO GET ALL NETWORK OBJECTS FOR IP DRIVER
1116
GET NEXT NETWORK OBJECT
1118
FETCH ATTRIBUTE VALUES
1120
STORE FULL NETWORK OBJECT IN SKELETON CACHE
1122
MORE NETWORK OBJECTS?
1124
YES
NO
GET LAST UPDATE FOR ALL ENDPOINTS FOR THIS IP DRIVER
1126
SORT LIST OF UPDATE TIMESTAMPS
1128
GET SKELETON POLICY
1130
CREATE TWO LISTS OF ENDPOINT OBJECTS BASED ON SKELETON POLICY: LIST OF FULL ENDPOINT OBJECTS AND LIST OF SKELETONIZED ENDPOINT OBJECTS
1132
CREATE FULL ENDPOINT OBJECTS
1134
CREATE SKELETONIZED ENDPOINT OBJECTS
1136
REPEAT PROCESS FOR SYSTEM OBJECTS
1138
B

FIG. 11B